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POLLEN GRAINS MORPHOLOGY OF *CREPIS ALBANICA* (JAV.) BABCOCK (*SIN. C. BALDACCII* SUBSP. *ALBANICA* JAV.)

ABSTRACT

This article includes the palynological study of pollen grains of *Crepis albanica*. The plant *Crepis albanica* is part of the Red List of Wild Flora of Albania. The material for the study is taken in National Herbarium in Tirana. For the palynological study of pollen grains of *Crepis albanica* is used acetolysis method and basic fuchsin. In order that the pollen grains stuck is used glycerin gelatin. The photos and the observation of palynological features are realized with light microscope with 1000X power. This study also includes the comparison of palynomorphological characteristics at *Crepis albanica* with *Crepis dioscoridis*, *Crepis foetida*, *Crepis neglecta* and *Crepis aurea*. From observation of pollen grains of *Crepis albanica* results that they are tricolporate. The shape of pollen grains from the outline is oblate spheroid. Exine appears thick, two- layers and with echinate sculpture of echinolophate type.

Keywords: *Crepis albanica*, pollen grains, exine, echinolophate.

INTRODUCTION

The genus *Crepis* is part of Asteraceae Martinov family (= Compositae Gisseke), which is considered as the largest family of plant with flowers, with about 1.532 genera and 23.790 species (SINGH, 2010). This genus is the second biggest genus of the tribe Cichorieae Lam. & DC (the old name is Lactuceae Cass.). The tribe Cichorieae Lam. & DC includes more than 98 genera and 1550 species (KILIAN *et al.*, 2009). Considered as one of the largest genera, *Crepis* attracted the attention of Ernest Babcock, who used the species of this genus as the model plant for the plant genetic analysis (ESKLUAL, 2017). *Crepis* is the genus

with about 200 species (BREMER, 1994). LINNÉ (1753) has determined 13 species of *Crepis*, from which 10 species are part of the genus today (ESKLUAL, 2017). In the Flora of Albania the genus *Crepis* is represented by 28 species (ANONYMOUS, 1988-2000).

Crepis species are distributed in the northern hemisphere, with only some species that are in the Southeast Asia (ESKLUAL, 2017). The origin of *Crepis* is thought to be in the region of Altai / Tien Shan in the Central Asia (BABCOCK, 1947a). From there the genus is spread in northeast in North America, in southwest of Southern Europe and in the North Africa and in the west across the southern part of the Ural Mountains into north-eastern Europe. The genus presently has its highest species diversity in the circum-Mediterranean area (ENKE, 2008).

Some species of genus *Crepis* are used as food In the form of salads, mostly their leaves and young seedlings (SANSANELLI and TASSONI, 2014). The studies carried out about the *Crepis* species, show that these plants contain phenolics, flavonoids, flavanols, tannins, saponins and that is why they are used in the treatment of neurological disorders (ZENGİN *et al.*, 2015; OZKAN *et al.*, 2016). Also pollen analysis of honey realized by foreign authors, but also from our country, indicates the presence of some *Crepis* species in honey (PUPULEKU, 2001; FORCONE, 2008).

The studies on the genus *Crepis* are also found in the literature of Palynology, both in foreign and in our country (TOMB, 1975; PUPULEKU, 2001; QURESHI *et al.*, 2002; OSMAN, 2006; FORCONE, 2008; ENKE, 2009; HESSE *et al.*, 2009; WANG *et al.*, 2009; DAUTI, 2016;).

The aim of this study is presentation of morphological features of pollen grains of *Crepis albanica* and also the comparison of these features with those of pollen grains of *Crepis aurea*, *Crepis dioscoridis*, *Crepis foetida* and *Crepis neglecta* taken from the literature of our country (PUPULEKU, 2001; DAUTI, 2016).

The palynomorphological data of pollen grains of *Crepis albanica* are presented for the first time in the literature of our country and in the world palynological literature.

MATERIAL AND METHODS

The material for the study was obtained in National Herbarium in Tirana. In order to realize the study of morphological characteristics of pollen grains a variety of processing methods can be used, but the most common for light microscopy studies are the following methods which are also used by us during the processing of pollen material:

Acetolysis of Erdtman method (ERDTMAN, 1956)

Acetolysis of Avetisjan method (AVETISJAN, 1950)

Basic fuchsin method (SMOLJANINOVA and GOLLUBKOVA, 1953)

The fixing of pollen grains is made with glycerin gelatin prepared according to Kisser method (SLLATKOV, 1967).

For the study of pollen grains of *Crepis albanica*, are prepared 3-6 microscope slides with the methods above. In order to accomplish the quantitative analysis of palynomorphological features, 31 pollen grains are taken in consideration. The study of palynomorphological features and the pollen grains photos are realized with light microscope Digital Microscope/Camera Software, Motic Images Plus 2.0 ML, B1 Series. The microscopic photos of pollen grains of *Crepis albanica* are made in polar and equatorial view with magnification 1000X, taken by Dauti Anxhela.

The palynomorphological data presented in this study belong to the processing of the material with acetolysis method. The terminology is based on that recommended by ERDTMAN (1952), PUNT *et al.* (1994), and KAPIDANI (2005).

RESULTS AND DISCUSSION

Genus: *Crepis* L.

Crepis albanica (Jav.) Babcock, Univ. Calif. Publ. Bot. 22:468 (1947) (sin. *C. baldaccii* subsp. *albanica* Jav.)

Perennial plant. Stems 3 – 4,35cm. In the cracks of limestone rocks of the northern Albania. Blooming june- august (ANONYMOUS, 1988-2000; DEMIRI, 1983); Is part of the Red List of Albania's Wild Flora (2013).

The pollen grains of *Crepis albanica* are tricolporate. Their polar axis varies from 32-35 (33.65) μm , while the equatorial diameter varies from 33-37 (35.2) μm . In polar view, the pollen grains have circular shape to hexagonal, while in equatorial view they have elliptic shape to spheroidal. The shape according to outline is oblate spheroidal (P/E= 0.94-1.00). Exine is thick and with echinate sculpture of type echinolophate (fenestrate).

The spines of the ridge are thin and look like needles. The length of spines varies from 2-2.5 μm , the width varies from 1-1.5 μm . Distance between spines varies from 0.5-1 μm . Thickness of exine without spines varies from 3-4 μm . Ectexine is thicker than endexine. Ectexine varies from 2-3 μm , while the endexine is about 1 μm . The pores appear with circular outline, with diameter 6-7 μm . Mesocolpium varies from 15-20 μm .(Fig. 1)

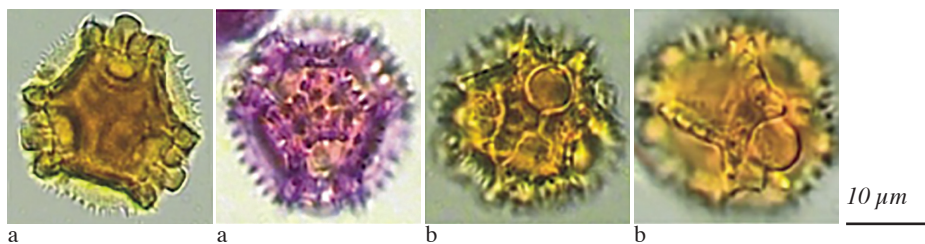


Figure 1. Pollen grains *Crepis albanica*; a. polar view, b. equatorial view (1000X).

In Table 1 are presented the palynomorphological features of *Crepis albanica* and they are compared with them of *Crepis aurea*, *Crepis dioscoridis*, *Crepis foetida* and *Crepis neglecta* taken from the literature (PUPULEKU, 2001; DAUTI, 2016).

Table 1. Comparative table of palynomorphological features of plant species *Crepis*

Palynomorphological features	<i>Crepis albanica</i>	<i>Crepis aurea</i>	<i>Crepis dioscoridis</i>	<i>Crepis foetida</i>	<i>Crepis neglecta</i>
Polar axis (P) µm	32- 35 (33.65)	25.5-30.4 (28.6)	28- 30 (28.8)	30-35 (33)	26- 29 (27)
Equatorial diameter (E) µm	33-37 (35.2)	29.6- 33.7 (32.2)	29-31 (29.7)	29- 33 (31)	26- 28 (27)
The thickness of exine(without spines) µm	3-4 (3.67)	1	3-4 (3.5)	3-4 (3.4)	3-4 (3.5)
The spines length µm	2-2.5 (2.1)	2.5	2	2	2
The spines width µm	1-1.5 (1.25)	2.5	1	1	1
Distance between spines µm	0.5- 1 (0.81)	-	1	1	1
Diameter of pores µm	6- 7 (6.8)	3	4- 6 (5.1)	4- 6 (5)	4-6 (5)
Mesocolpium µm	15- 20 (17)	-	13- 15 (14)	13- 15 (14)	13- 15 (14)

Based on the data in Table 1 we notice that the pollen grains of *Crepis albanica* are bigger than other *Crepis* species, while the pollen grains of *Crepis neglecta* are smaller. Also we notice that the pollen grains of *Crepis albanica*, *Crepis aurea* and

Crepis dioscoridis have the equatorial diameter bigger than the polar axis. At the pollen grains of *Crepis foetida* polar axis is bigger than equatorial diameter, while at *Crepis neglecta* the pollen grains have the same polar axis and equatorial diameter.

The pollen grains of *Crepis albanica* have a thicker exine than other *Crepis* species, while the pollen grains of *Crepis aurea* have a thinner exine. Regarding to the length and the width of spines, we notice that the pollen grains of *Crepis aurea* have the longer spines and the wider than other *Crepis* species, while the distance between spines is almost the same. At the pollen grains of *Crepis albanica* we notice that the pores have a bigger diameter than other *Crepis* species, while pollen grains pores of *Crepis aurea* have a smaller diameter. Mesocolpium, is bigger at the pollen grains of *Crepis albanica*.

CONCLUSIONS

From the analysis of palynotaxonomical features of pollen grains of *Crepis albanica* (Jav.) Babcock (sin. *C. baldaccii* subsp. *albanica* Jav.) results that:

1. The pollen grains of *Crepis albanica* are bigger than other *Crepis* species.
2. The exine is a bit thicker at pollen grains of *Crepis albanica* and thinner at *Crepis aurea*.
3. Diameter of pores is bigger at pollen grains of *Crepis albanica*.
4. The pollen grains mesocolpium of *Crepis albanica* is bigger.
5. The pollen grains of *Crepis aurea* have the longer and the wider spines than other *Crepis* species.

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